FURTHER MATHEMATICS

UNIT 3

Due Date:

Name_____

30 marks

ASSIGNMENT

UNIT **3** – **0** **2** H

1. **Table 1** shows the heights (in cm) of three groups of randomly chosen boys aged 18 months, 27 months and 36 months respectively.

| | Height (cm) | |
18 months	27 months	36 months
76.0	82.0	88.0
78.5	83.1	88.8
78.6	84.0	90.0
80.0	86.8	92.3
80.5	87.2	93.0
81.2	87.6	94.1
82.8	88.3	94.2
83.2	90.7	95.8
83.4	91.0	96.9
83.7	92.3	97.1
85.8	92.5	97.8
86.6	93.1	99.2
87.3	94.8	100.6
89.8	97.2	103.8

Table 1.

a) Complete **Table 2** by calculating the standard deviation of the heights of the 18-month-old boys. Write your answer correct to one decimal place.

age	18 months	27 months	36 months
mean	82.7	89.3	95.1
standard deviation		4.5	4.5

Table 2.

1 mark

A 27-month-old boy has a height of 83.1

b) Calculate his standardised height (z score) relative to this sample of **27-month-old** boys, showing all working. Write your answer correct to one decimal place.

_____

_____2 marks

c)   The heights of the 27-month-old boys are normally distributed.
What percentage of 27-month-old boys have heights between 80.3 and 93.8 cm.

_____

_____1 mark

The heights of the 36-month-old boys are also normally distributed. A 36-month-old boy has a standardised height of 2.

d)   Approximately what percentage of 36-month-old boys will be shorter than this child?

_____

_____1 mark

Using the data from **Table 1**, boxplots have been constructed to display the distributions of heights of 36-month-old and 27-month-old boys as shown below.
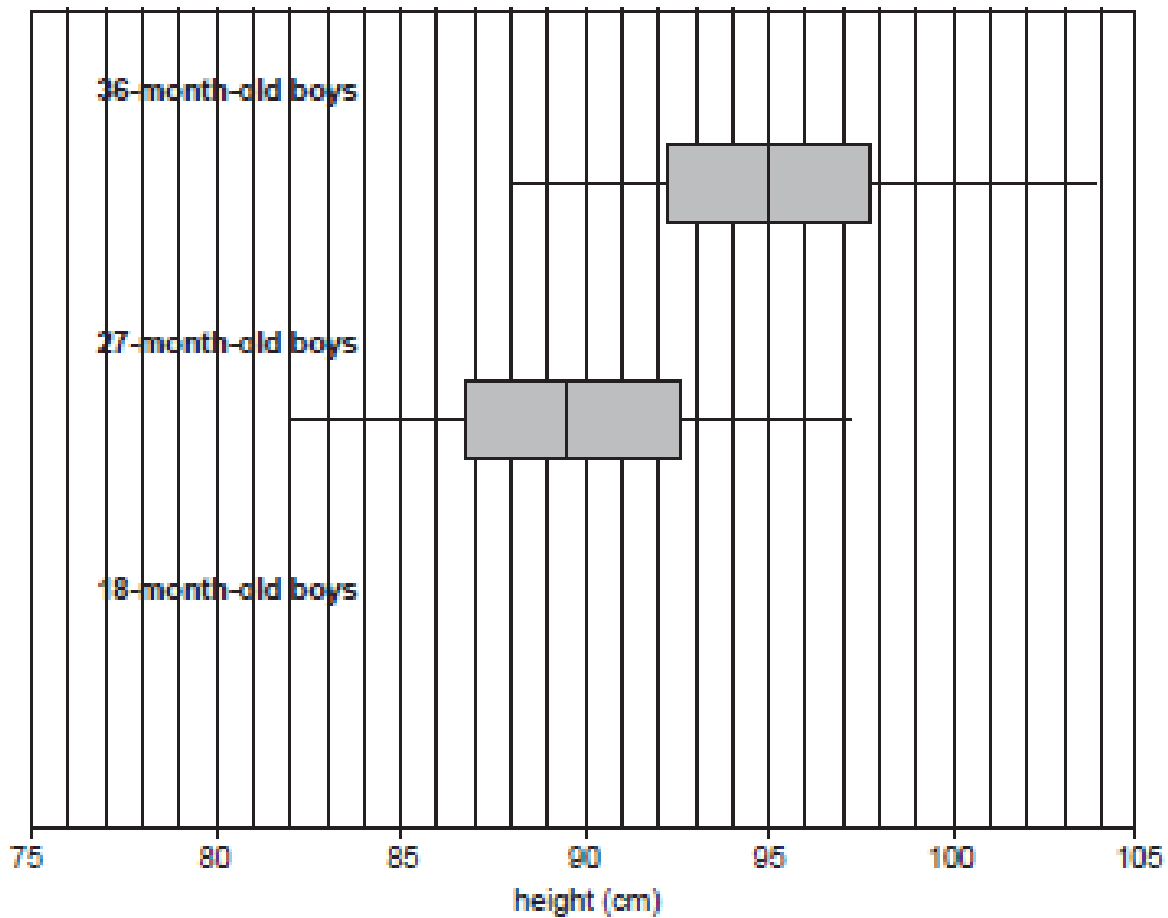
e)   Complete the display by constructing and drawing a boxplot that shows the distribution of heights for the **18-month-old** boys.

2 marks

f) Use the appropriate boxplot to determine the median height (in centimetres) of the **27-month-old** boys.

_____1 mark

The three parallel boxplots suggest that height and age (18 months, 27 months, 36 months) have a positive association.

g) Explain why, giving reference to an appropriate statistic.

_____

_____2 marks

2. Do women study more than men? Twenty-five students from a university course were asked how many minutes they studied on a typical weeknight. Their responses are listed in the table below:

Women	180, 240, 120, 180, 120, 170, 150, 120, 180, 180, 150, 200, 150, 180, 150, 180, 120, 60, 120, 180, 180, 90, 180, 120,120
Men	90, 120, 90, 240, 90, 60, 30, 120, 90, 150, 120, 60, 300, 60, 120, 60, 30, 210, 120, 90, 150, 210, 120, 120, 180

a) There are two variables in this data set, gender and study time. Determine the type of data that is represented by each variable.

Gender_____

Study time_____

2 marks

b) Construct a back-to-back stemplot to compare study time for men and women in the space below. (HINT: you may need to think about splitting stems!)

Key: 1|8 = 180 minutes

2 marks

c) In the working space below state the values of the five number summary

|	Women	Men
Minimum		
Q1		
Median		
Q3		
Maximum		

3 marks

d) Construct a set of parallel boxplots to compare study time for men and women. Include a suitable heading, scale and axis label. You must justify the presence or absence of outliers.

2+2 = 4 marks

e) Do the parallel boxplots support the statement "women study more than men"? Justify your answer with a reference to an appropriate statistic.

_____

_____2 marks

3. The histogram shows distribution of heart weight (in kg) of 27 animal species plotted on a log scale.
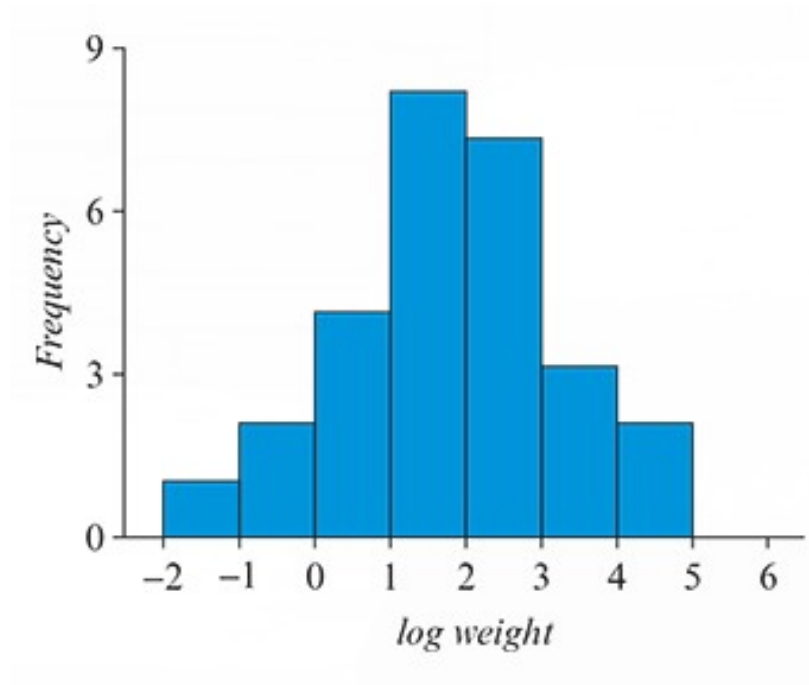
a) i. The heart weight of a dog is 0.135 kg. What log value would this represent (to 2 significant figures)?

_____

_____

ii. The heart weight of a hippo is 590 kg. What is the log of this heart weight (to 3 significant figures)?

_____

_____

b) i. What heart weight is represented by the number 3 on the log scale?

_____

_____

ii. What heart weight is represented by -2 on the log scale?

_____

_____

c) Use the histogram to determine;

i.   the number of these animals with heart weights under 1 kg

_____

_____

ii.   the number of these animals with heart weights between 10 and 100 kg

_____

_____

iii.   the percentage(to the nearest whole number) of these animals with heart weights over 10 000 kg

_____

_____

2+2+3 = 7 marks